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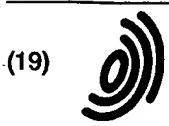
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(54) A recessed, mount dishwasher or household electric appliance with concealed actuation of an electromechanical programmer

(57) A recessed-mount dishwasher or household electric appliance with an electromechanical programmer installed in the loading door (1) and a disk-shaped programmer control knob (9) received on the door (1) inside and accessible, for its manual operation, through an opening (10), in the top edge (4) or a side edge of the

door, which exposes a first sector of a peripheral cylindrical annulus (12) of the knob (9), a second sector of the cylindrical annulus (12), different from the first, being visible, with the door (1) half-opened, through a window (13) formed in the top edge (4) of the door.

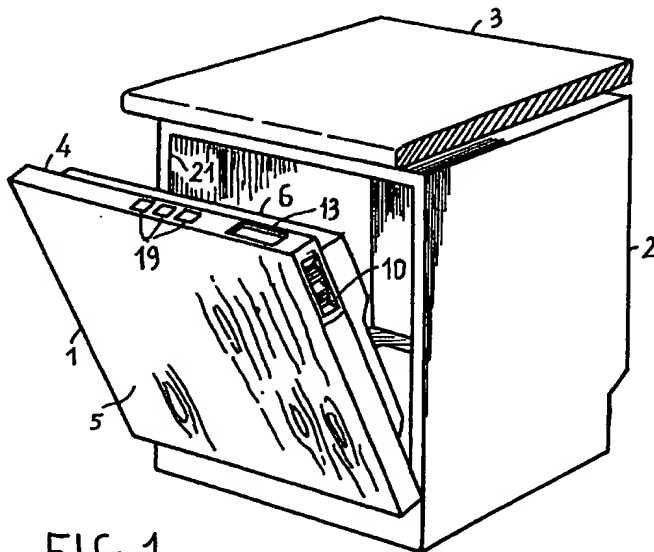


FIG. 1

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Description

The present invention relates to a recessed-mount dishwasher, preferably but not necessarily of the so-called combination type, because of it coming with an oven superposed, and more generally to a recessed-mount household electric appliance equipped with an electromechanical programming device.

A demand, with recessed-mount dishwashers which are intended for installation inside kitchen furniture of the assembly type having homogeneous aesthetic features, under a work surface disposed at a height on the order of 80-85 cm above floor level, is that programming the machine for work and visually checking the settings performed be an easy and ergonomic operation to carry out.

Concurrently therewith, the presence and exposure to view, on the machine front, of control and display members which are inconsistent with the modular aesthetic features of the host furniture and with the provision of a "matched" ornamental panel spanning the full height of the machine front should be avoided.

To fill this demand, dishwashers have been proposed wherein the control panel is "concealed" from view once the machine door, hinged to the bottom edge, is closed.

By opening the door at least a crack, the control panel, suitably disposed on the top edge of the door, becomes accessible for the necessary setting operations.

Through a window provided in the top edge of the door, a knurled knob keyed to the shaft of a conventional electromechanical programmer, oriented perpendicularly to the machine front, can be operated.

The cylindrical peripheral surface of the knob, accessible for programming purposes, carries numerical or coded references which make the selected settings readable.

This is, however, an inconvenient solution because, during the setting operation, the angular position of the knob is hidden from view by the operator's hand.

Furthermore, however well the top edge of the door may be protected, with the door closed, by the work surface overhanging it, the ingress through the programming knob window of liquid or solid matter, potentially harmful to the device, cannot be ruled out with the door partially open.

To jointly enable a programming device to be set and the resultant setting checked visually, it has also been proposed in DE3834618 of mechanically coupling a frontally operable programming knob by a positive drive to a display disk adjacent to the knob and visible through a window, which evidently mars the machine appearance.

Further, the problem of an indicator provided through the front wall at a very low location being difficult to read is only partially solved.

It is the object of this invention to provide a recessed-mount dishwasher, perhaps of the combina-

tion type, incorporating a concealed control panel which is functional, particularly simple, reliable and convenient to use.

According to the invention, this object is achieved in a recessed-mount dishwasher by a control panel having the following features:

- an electromechanical programmer is mounted on the inside of the front wall of the dishwasher door with its axis perpendicular to the front wall of the door;
- a disk-shaped control knob is keyed to the programmer shaft and provided, on its periphery, with a means of rotary actuation carrying, on an outer surface thereof, numerical, alphabetic or coded program references;
- a portion of said outer surface of the knob actuating means, related to the angular position of the knob, is visible through a first window cut in the top edge of the door and facing upwards, with the door partially open;
- preferably, the window is covered with a clear protective screen;
- a portion of the actuating means is accessible through a second opening provided in the top edge or, preferably, in a side edge of the machine door.

The actuating means may consist of a knob peripheral cylindrical annulus having a surface with a high frictional coefficient, or of a cogged belt made of a resilient material, and being in mesh engagement with a corresponding toothing on the knob and stretched between the knob and a deflector pulley.

The features and advantages of the invention will be made clear by the following description and the accompanying drawings, in which:

Figure 1 is a perspective view showing schematically a dishwasher according to a first embodiment of the present invention, with the loading door partially open;

Figure 2 is a view from above of a portion of the door of the dishwasher in Figure 1;

Figure 3 is a front section through a portion of the door of the dishwasher in Figure 1;

Figure 4 is a sectional view of the door portion of Figure 3, taken along I-I in Figure 3;

Figure 5 is a front section through a portion of a dishwasher door according to a variation of the present invention.

With reference to the drawing figures, the dishwasher of the recessed-mount type comprises a front loading door 1 hinged downwardly to a body 2 which is recessed under a work surface 3, or another household appliance such as an electric and/or microwave oven.

The work surface, or superposed household appliance, overhangs the body by an amount which is at least equal to the thickness of the front door.

With the loading door closed, the top edge 4 of the door is concealed and protected under the work surface.

The top edge of the door is formed by a profiled template 4 which spans the full width of the door and is continuous with the front wall and the side edges of the door.

The front wall of the door is covered with a plastics laminate 5 whose pattern, color and finish are harmonized with those of the host furniture.

The door 1 is closed rearwardly by an inner door 6 which is sealed to the edges 21 of the machine loading opening.

Accommodated between the front wall of the door and the inner door is an electromechanical programmer 7 having a shaft 8 perpendicular to the front wall.

A disk-shaped programming knob 9 is keyed to the shaft 8, close against the door front panel.

The disk-shaped knob 9 is provided with a cylindrical annulus 12 on its periphery. This is suitably knurled with raised ribs 11 to produce a suitable mechanical friction and enable a torque to be applied for manually turning the knob through an actuation opening 10.

The opening 10 is advantageously formed in a head of the profiled template 4, correspondingly with a side edge of the door and exposes a sector of the cylindrical annulus 12 of the disk-shaped knob 9.

The knurled finish borders lands 16 where numerical, alphabetic or coded program references are provided by printing, adhesive labels, impression or embossing.

A sector of the cylindrical bezel 12 locates opposite a window 13, in the form of an elongate slit cut in the top edge of the door, formed by the template.

The window 13 is covered by a clear protective screen 14 which is snap fitted, by means of holding teeth 17, 18, over the window 13, and through which the program digits on the cylindrical bezel can be viewed.

It is apparent that with the door partially opened, the operator can simultaneously manipulate the knob 9 through the opening 10 and see the position adopted by the knob through the window 13.

Since the window 13 is open upwards, the reading is particularly easy, because it is effected from a point of view located essentially above the window 13 whose opening plane is oriented perpendicularly to the point of view.

The operation of the knob is also particularly easy through the opening 10, whose location on a side edge of the door virtually avoids the risk of falling liquids or solid elements getting inside the opening 10 from above.

The screen 14 provides a similar protection for the window 13 opposite the top edge of the door.

The template 4 which forms the top edge of the door is suitably provided with an inner plate 15 which extends parallel to the front wall of the door and acts as a holder for the programming device 7 and perhaps other control or display devices.

Usually provided on the top edge of the door are, in fact, other control and display devices, represented in Figures 1 and 2 by pushbuttons 19.

The foregoing description obviously covers a preferred embodiment of the invention, and many modifications may be made thereunto within the scope of the appended claims.

For example, the knurled finish of the knob may be replaced with suitable corrugations of another type, such as coatings effective to enhance roughness, ensure a high frictional coefficient, and in all cases to permit rotation of the knob by hand. The high frictional coefficient can also be obtained by fitting the knob with an annular ring of a material, such as rubber, which has an inherently high coefficient of friction.

In this respect, Figure 5 shows a front section through a second embodiment of the present invention, wherein both the display window 13 and the knob actuation opening 10 are facing the top edge of the door.

In this second embodiment, the knob 9 has, on its cylindrical outer surface, a cylindrical toothing 23 which meshes with a toothing 24 formed on the inward face of a belt 25 which is trained partially around the knob 9 and extends to a cogged deflector pulley or wheel 26.

Numerical, alphabetic or coded program references are impressed, preferably by hot padding or some equivalent wear-resistant indelible method, on the outer surface of the belt, as suitably roughened or imparted a high frictional coefficient.

The developed pitch line of the belt is an N (2, 3, or more) multiple of the developed pitch line of the knob toothing, so that the program references, being orderly repeated N times on the belt, will always be in the same phase relationship to the angular position of the knob.

The timing of the belt and knob can be ensured by mutual referencing, preferably using a tooth with twice the pitch of (more generally a different pitch from) the rest and a corresponding groove, respectively disposed on either of the two knob and belt elements.

The knob 9 and deflector pulley 26 are arranged such that a substantially straight section of the belt extends close to the top edge of the door and is simultaneously facing the window 13 and opening 10.

The window 13 and opening 10 may be placed a suitable distance apart, so that the operation of the knob through the opening 10, by acting on the belt, will not impair a comfortable readability of the belt portion facing the window 13.

Whereas the opening 10 preferably locates at a zone of the belt which is at least in part supported by the knob, the window 13, through which no mechanical action is applied to the belt, may open to any zone of the straight section and requires no opposed inner support, although it does not exclude one.

It is apparent that the embodiment of Figure 5 may be altered by providing a display window opposite the top edge of the door and an actuation window accessible from a side edge of the door to secure all the benefits mentioned in connection with the embodiment

described with reference to Figures 1 to 4, with the added advantage of affording great freedom of spaced-apart spatial positioning of the display window relative to the actuation opening.

Finally, while the foregoing description refers to a dishwasher, it is apparent that the invention is susceptible of application to any types of recessed-mount household electric appliances, with a control panel which includes an electromechanical programming device. For example, in today's electric cooking ovens, whether of the resistance or the microwave type, the cooking time can be programmed by means of an electromechanical knob timer, and this can be concealed as per the teaching provided herein.

Claims

1. A recessed-mount household electric appliance comprising a front loading door (1) hinged to one edge and provided with a control panel on a top edge (4), and comprising an electromechanical programmer (7) received in said front door (1) with the shaft (8) lying perpendicularly to the front wall (5) of said door (1), the programmer being operable by means of a generally disk-shaped knob (9) keyed to its shaft (8) and located on the inside of said door (1) between said programmer (7) and said front wall (5), characterized in that
 - a top or side edge (4) of said door, accessible by partially opening said door (1), is provided with an access opening (10) for rotating said knob by hand;
 - said disk-shaped knob (9) is provided on its periphery with manual actuation means (12) carrying alphabetic, numerical or coded program references impressed on its outer surface; and
 - said top edge (4) of the door (1) is provided with a display window (13) showing, with the door partially opened, a portion of said actuation means, so that said knob can be turned manually through said access opening (10) with simultaneous display of its angular position through said display window (13).
2. A household electric appliance according to Claim 1, wherein said actuation means consists of a cylindrical annulus (12) having a surface with a high frictional coefficient obtained by knurling, corrugation, coating or application of a resilient material.
3. A household electric appliance according to Claim 1, wherein said knob (9) is provided with a toothed peripheral annulus (23) and said actuation means comprises a cogged belt (25) in mesh engagement with said toothed peripheral annulus, said belt having a developed length which is a multiple of the developed pitch line of said toothed annulus (23) and a deflector wheel (26) for said belt, said pro-

gram references being provided on an outer surface of said belt (25).

4. A household electric appliance according to Claim 3, wherein said toothed annulus (23) and said cogged belt (25) are provided with a means of timing said belt to said knob.
5. A household electric appliance according to Claim 1, 2, 3 or 4, wherein said display window (13) is covered with a clear screen (14).
6. A dishwasher according to Claims 1, 2, 3, 4 or 5, wherein said access opening (10) and said display window (13) are formed in a profiled template (4) to provide said top edge and are frontally concealed by said front wall.
7. A household electric appliance according to Claim 6, wherein said profiled template comprises an inner plate (15) parallel to said front wall for mounting said electromechanical programmer.

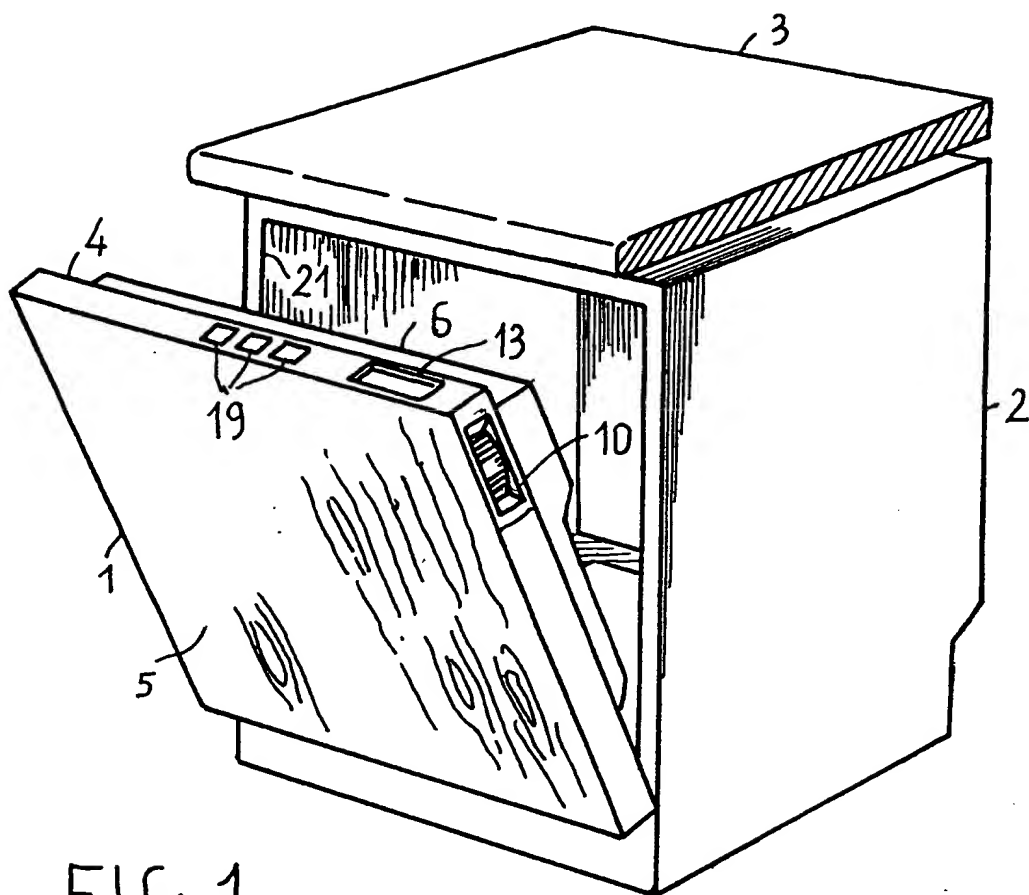


FIG. 1

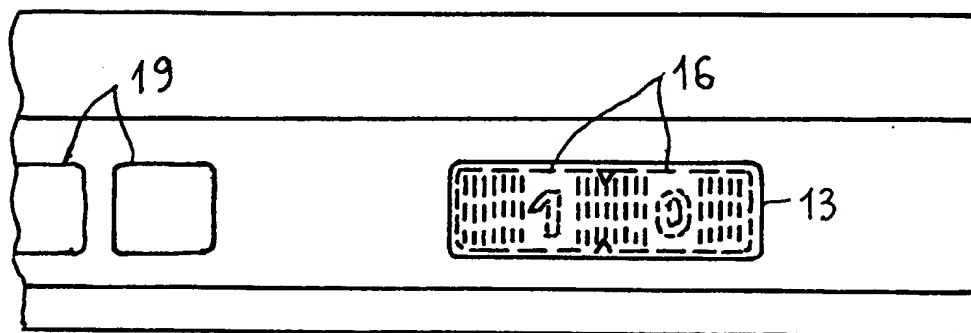


FIG. 2

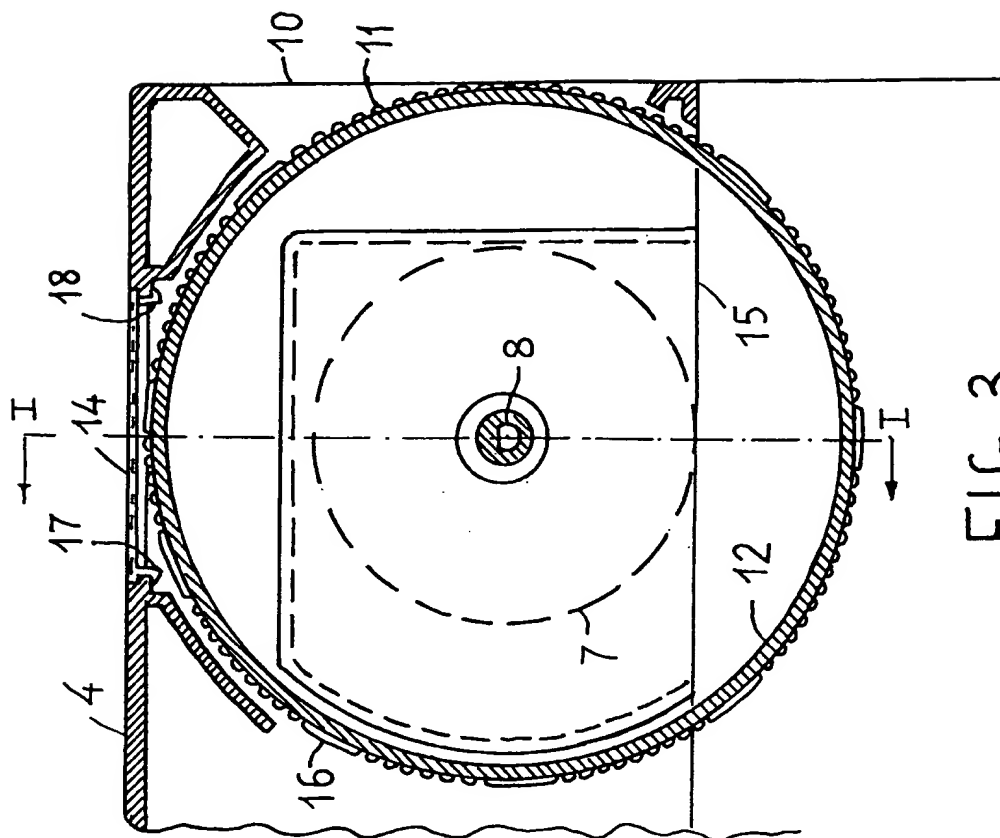


FIG. 3

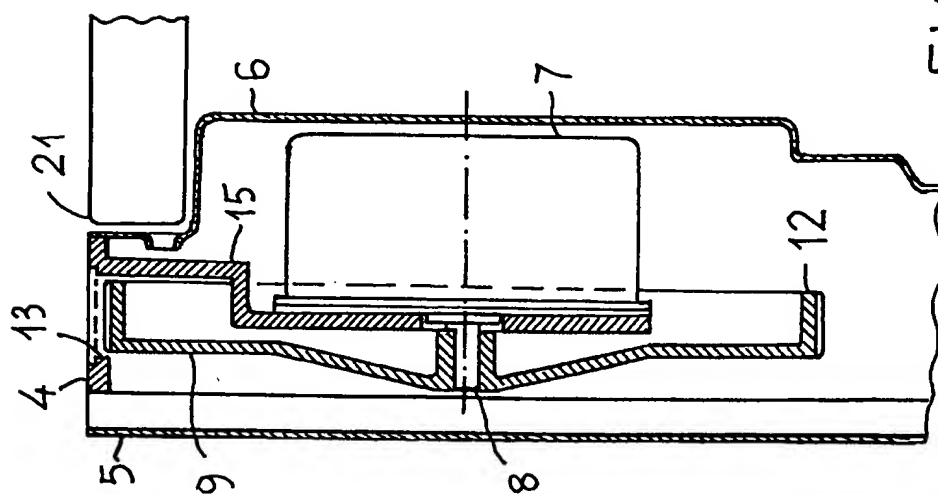
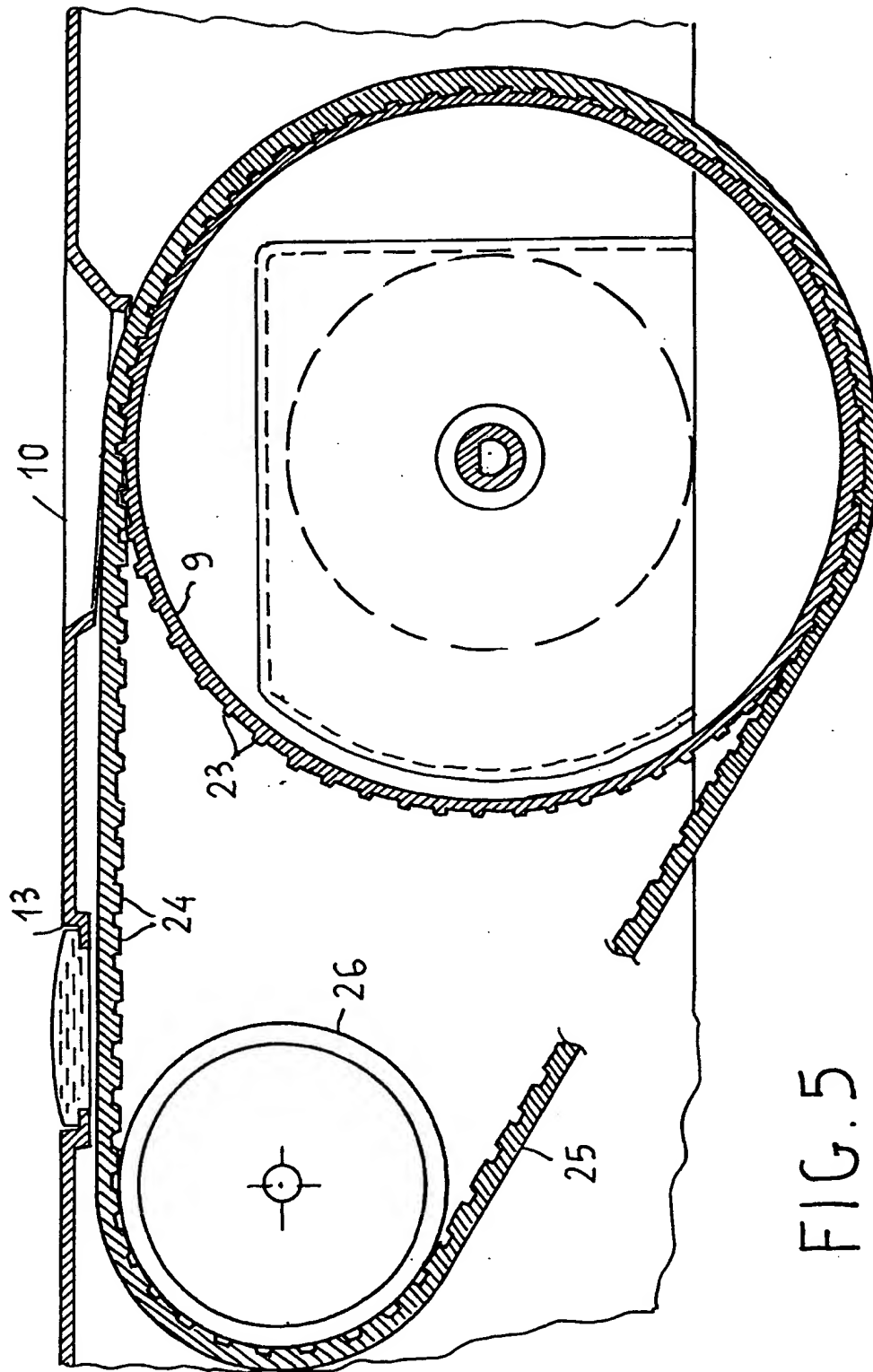


FIG. 4





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EUROPEAN SEARCH REPORT

Application Number
EP 95 20 2335

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	GB-A-2 269 002 (ZANUSSI ELETTRODOMESTICI S.P.A.)	1,2	A47L15/42 D06F39/00
A	* the whole document * ---	3-6	
A	DE-A-38 34 618 (BOSCH-SIEMENS HAUSGERÄTE GMBH)	1-7	
	* the whole document * ---		
A	DE-U-88 15 295 (BOSCH-SIEMENS HAUSGERÄTE GMBH)	1-4	
	* the whole document * -----		
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			A47L D06F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 30 November 1995	Examiner Kellner, F
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